1. A system for delivering broadband ultrasound to liquid, comprising:

first and second ultrasonic transducers, the first transducer having a first frequency and a first ultrasound bandwidth, the second transducer having a second frequency and a second ultrasound bandwidth, the first and second bandwidths being overlapping with each other, the first frequency being different from the second frequency; and

ultrasound generator means for driving the transducers at frequencies within the bandwidths , the first and second transducers and the generator means being constructed and arranged so as to produce ultrasound within the liquid and with a combined bandwidth that is greater than either of the first or second bandwidths.

2. A system according to claim 1, further comprising a third ultrasonic transducer having a third frequency and a third ultrasound bandwidth, the third bandwidth being overlapping with at least one of the other bandwidths, the third frequency being different from the first and second frequencies, and wherein the generator means comprises means for driving the third transducer within the third bandwidth so as to produce ultrasound within the liquid and with a combined bandwidth that is greater than either of the first, second or third bandwidths.

3. A system according to claim 1, wherein the first frequency is about 40khz and the first bandwidth is about 4.1khz, and wherein the second frequency is about 44khz and the second bandwidth is about 4.2khz, the ultrasound having a combined bandwidth of at least about 8khz.

4. A system according to claim 1, further comprising clamping means for applying compression to at least one of the transducers.

5. A system according to claim 1, wherein the first and second frequencies are harmonic frequencies.

6. A system according to claim 5, wherein the harmonic frequencies are between about 100khz and 350khz.

7. A system according to claim 1, further comprising at least one other additional ultrasonic transducer having an additional frequency and an additional ultrasound bandwidth, the synergistic bandwidth being overlapping with at least one other bandwidth, the additional frequency being different from the first and second frequencies, and wherein the generator means comprises means for driving the additional transducer within the additional bandwidth so as to produce ultrasound within the liquid and with a combined bandwidth that is greater than any other bandwidth.

8. A system according to claim 7, wherein the additional frequency is a harmonic resonant frequency between about 100khz and 350khz.

9. A system according to claims 1,2, 5, 7 or 8, wherein the bandwidths overlap so that, in combination, the transducers produce ultrasonic energy at substantially all frequencies within the combined bandwidth.

10. A system according to claims 1,2, 5, 7 or 8, wherein the bandwidths overlap so that the transducers and generator means produce ultrasonic energy, at each frequency, that is within a factor of two of ultrasonic energy produced by the transducers and generator means at any other frequency within the combined bandwidth.

11. A system according to claims 1,2, 5, 7 or 8, wherein the bandwidths overlap so that the transducers and generator means produce ultrasonic energy, at each frequency, that is substantially equal to the ultrasonic energy produced by the transducers and generator means at any other frequency within the combined bandwidth.

12. A system for delivering ultrasound to liquid, comprising:

one or more ultrasonic transducers, each transducer having an operating frequency within an ultrasound bandwidth; and

an ultrasound generator means for driving the transducers at frequencies within the bandwidth, the generator being amplitude modulated at a modulation frequency and having AM frequency sweep means for sweeping the modulation frequency as a function of time, the generator means and transducers being constructed and arranged so as to produce amplitude modulated ultrasound within the liquid.

13. A system according to claim 12, wherein the AM frequency sweep means comprises means for providing an AM sweep rate between about 1hz and 100hz.

14. A system according to claim 12, further comprising clamping means for applying compression to at least one of the transducers.

15. A system according to claim 12, wherein the operating frequency is a harmonic frequency between about 100khz and 350khz.

16. A system according to claims 1 or 12, wherein the generator means comprises two or more ultrasound generators that are synchronized in magnitude and phase so that there is substantially zero frequency difference between signals generated by the generators.

17. A system according to claim 16, further comprising timing means for generating a timing signal between the generators to synchronize the signals.

18. A system according to claim 16, further comprising FM means for generating a master frequency modulated signal to each generator to synchronize the signals from the generators.

19. A system according to claim 5, wherein the generator means is frequency modulated over a range of frequencies within the bandwidth of each transducer.

20. A system according to claim 5, wherein the generator means is frequency modulated over a range of frequencies within the bandwidth of each transducer, and wherein the generator means is amplitude modulated over a range of frequencies within the bandwidth of each transducer.

21. A system according to claims 1 or 12, further comprising a chamber for holding the solution so as to clean or process objects therein.

22. A system according to claim 21, wherein the chamber comprises a material selected from the group of 316L stainless steel, 304 stainless steel, polytetrafluoroethylene, fluorinated ethylene propylene, polyvinylidine fluoride, perfluoroalkoxy, polypropylene, tantalum, teflon coated stainless steel, titanium, hastalloy, polyetheretherketone, and mixtures thereof.

23. A system according to claims 1 or 12, wherein one or more transducer comprises a transducer array.

24. A system according to claims 1 or 12, wherein each transducer comprises an array of ultrasound transducer elements, each element within the array being driven at substantially the same frequency as other elements within the same array.

25. A system according to claims 1 or 12, wherein each transducer comprises one of the first, second, third or fourth harmonics frequencies .

26. A system according to claims 1 or 12, further comprising a liquid, the liquid being responsive to the ultrasound to produce cavitation implosion therein.

27. A system according to claim 26, wherein the liquid comprises one or more chemicals selected from the group of solvents, aqueous solutions, and semi-aqueous solutions.

28. A single tank, multi-generator ultrasound system for applying ultrasound to objects within the tank, comprising: a plurality of generators connected to a common multiplexer, each generator having a different frequency, the multiplexer having a single output connected to a plurality of ultrasound transducers within the tank, each transducer having a resonant frequency and one or more harmonic frequencies that correspond to the different frequencies of the generators, the multiplexer, generators, and transducers being constructed and arranged wherein one generator drives all of the transducers with substantially the same frequency, the one generator being selectable by a user of the system and through the multiplexer so as to select the desired frequency range, and hence the right generator, according to the cavitation implosion energy that is desired within the tank.

29. A method of delivering broadband ultrasound to liquid, comprising the steps of driving a first ultrasound transducer with an ultrasonic generator at a first frequency and within a first ultrasound bandwidth, and driving a second ultrasound transducer with an ultrasonic generator at a second frequency and within a second ultrasound bandwidth that overlaps at least part of the first bandwidth, wherein the first and second transducers, in combination with the generator, produce ultrasound within the liquid and with a combined bandwidth that is greater than either of the first or second bandwidths.

30. A method according to claim 29, further comprising the step of compressing at least one of the transducers.

31. A method according to claim 29, further comprising the step of driving the first and second transducers at harmonic frequencies between about 100khz and 350khz.

32. A method according to claim 29, further comprising the step of arranging the bandwidths to overlap so as to produce ultrasonic energy, at each frequency, that is within a factor of two of ultrasonic energy produced at any other frequency within the combined bandwidth.

33. A method of delivering ultrasound to liquid, comprising the steps of (a) arranging one or more transducer arrays with an ultrasound tank so as to couple ultrasound energy between the transducer arrays and the liquid, each of the transducer arrays being compressed to structurally protect the transducer array, each of the transducer arrays having a harmonic frequency between about 100khz and 350khz, and (b) driving the ultrasonic transducer array at a range of frequencies centered about the harmonic frequency.

34. A method according to claim 33, further comprising the step of driving the transducer array through the range of frequencies at a sweep rate.

35. A method according to claim 33, further comprising the steps of (a) arranging one or more additional transducer arrays with an ultrasound tank so as to couple additional ultrasound energy between the additional transducer arrays and the liquid, each of the additional transducer arrays being compressed to structurally protect each array, each of the additional transducer arrays having a harmonic frequency between about 100khz and 350khz, and (b) driving the transducer arrays so as to produce ultrasound within the liquid and with a combined bandwidth that is greater than the bandwidth of a single transducer array.

36. A method of delivering ultrasound to liquid, comprising the steps of generating a drive signal for one or more ultrasonic transducer arrays having an operating frequency within an operational bandwidth, amplitude modulating the drive signal at a modulation frequency, and changing the modulation frequency, selectively, so as to produce ultrasound within the liquid and to substantially eliminate resonances at the modulation frequency.

37. A method of amplitude modulating an ultrasonic generator connected to a power line having a power line frequency, comprising the steps of: rectifying the power line frequency in a full wave modulation pattern, and selecting a portion of a leading quarter sinusoid of the pattern that ends at a selected amplitude in a region between zero and 90° and between 180° and 270° of the sinusoid.

38. A method of amplitude modulating an ultrasonic generator connected to a power line having a power line frequency, comprising the steps of: rectifying the power line frequency in a half wave modulation pattern, and selecting a portion of a leading quarter sinusoid of the pattern that ends at a selected amplitude between zero and 90° of the sinusoid.

39. A generator for driving at least one ultrasonic transducer array with variable AM modulation amplitudes, comprising:

frequency generation means for driving the transducer array at an operational frequency within a range of frequencies that are centered about a resonant frequency of the transducer;

means for connecting the generator to a power line having a power line frequency; and

means for rectifying the power line frequency in a modulation pattern, and for selecting a portion of a sinusoid of the pattern to acquire the AM amplitude selectively.

40. A generator according to claim 39, further comprising means for rectifying the power line frequency in a full wave modulation pattern, and selecting a portion of a leading quarter sinusoid of the pattern that ends at a selected amplitude in a region between zero and 90° and between 180° and 270° of the sinusoid.

41. A generator according to claim 39, further comprising means for rectifying the power line frequency in a half wave modulation pattern, and selecting a portion of a leading quarter sinusoid of the pattern that ends at a selected amplitude between zero and 90° of the sinusoid.

42. A generator according to claim 39, further comprising sweep rate means for sweeping the operational frequency through the range of frequencies at a sweep rate frequency.